WHAT IS CLAIMED IS:

1. An optical information reproducing apparatus for recording or reproducing information on/from an optical disk using an optical spot, and which controls rotation of the optical disk so as to provide a constant linear velocity by changing a rotation frequency in accordance with a radial-direction position of the optical spot , said apparatus comprising:

a rotation control circuit that controls rotation of the optical disk;

a focus servo control circuit and a tracking servo control circuit for the optical spot; and

a tracking control circuit that adjusts a servo-loop gain for tracking servo control in accordance with the radial-direction position of the optical spot.

2. An apparatus according to Claim 1, wherein said tracking control circuit adjusts the servo-loop gain in accordance with a steady state rotation frequency at the radial-direction position of the optical spot.

3. An apparatus according to Claim 1, wherein

a recording region of the optical disk is divided into a plurality of zones in a radial direction,

said rotation control circuit controls rotation of the optical disk so that a linear velocity is substantially constant between respective zones by changing the rotation frequency for each zone, and

said tracking control circuit adjusts the servo-loop gain in accordance with a steady state rotation frequency for each zone.

4. An apparatus according to Claim 1, wherein said tracking control circuit adjusts the servo-loop gain by setting a gain proportional to an eccentric acceleration corresponding to the radial-direction position of the optical spot.

5. An apparatus according to Claim 1, wherein said tracking servo control circuit is controlled by a sampling frequency that changes in accordance with the radial-direction position of the optical spot, and wherein said tracking control circuit performs gain adjustment in accordance with the radial-direction position of the optical spot in a state in which a coefficient of a phase compensation filter included in said tracking servo control circuit is fixed.

6. An apparatus according to Claim 1, wherein the optical disk is a sample servo disk having a servo region provided radially from the center of the optical disk, and wherein said tracking control circuit performs gain adjustment in accordance with the radial-direction position of the optical spot in a state in which a coefficient of a phase compensation filter included in said tracking servo control circuit is fixed.

7. An apparatus according to Claim 1, wherein said tracking servo control circuit is controlled with a constant sampling period in the entire region of the optical disk, and wherein said tracking control circuit adjusts the servo-loop gain by adjusting a coefficient of a phase compensation filter included in said tracking servo control circuit and a gain in accordance with

the radial-direction position of the optical spot.

8. An apparatus according to Claim 1, wherein

a recording region of the optical disk is divided into a plurality of zones,

said rotation control circuit controls rotation of the optical disk so that a linear velocity is substantially constant between respective zones by changing the rotation frequency for each zone, and makes blocks from among the plurality of zones, each having a rotation frequency within a predetermined rotation-frequency range a block, and

said tracking control circuit adjusts the servo-loop gain for each block.

9. An apparatus according to Claim 1, wherein said tracking control circuit adjusts the servo-loop gain so that when a servo gain at a highest rotation frequency Wmax is represented by Gmax, and a rotation frequency is represented by Wcurr, a servo gain Gcurr satisfies the following relationship:

$$Gcurr \fallingdotseq Gmax \times Wcurr/Wmax.$$

10. An apparatus according to Claim 1, wherein said focus servo control circuit comprises a circuit that adjusts a servo-loop gain for focus servo control, and wherein, when said tracking control circuit changes the servo-loop gain for tracking servo control with a predetermined ratio, said focus control circuit changes the servo-loop gain for focusing servo control with a ratio proportional to the square root of the predetermined ratio.

11. An apparatus according to Claim 1, wherein said tracking control circuit adjusts the servo-loop gain in accordance with a transient change of the rotation frequency caused by movement of the optical spot in a radial direction.

12. An optical information reproducing apparatus for recording or reproducing information on/from an optical disk using an optical spot, and which controls rotation of the optical disk so as to provide a constant linear velocity by changing a rotation frequency in accordance with a radial-direction position of the optical spot, said apparatus comprising:

a rotation control circuit that controls rotation of the optical disk;

a focus servo control circuit and a tracking servo control circuit for the optical spot; and

a focus control circuit that adjusts a servo-loop gain for focus servo control in accordance with the radial-direction position of the optical spot.

13. An apparatus according to Claim 12, wherein said focus control circuit adjusts the servo-loop gain in accordance with a steady state rotation frequency at the radial-direction position of the optical spot.

14. An apparatus according to Claim 12, wherein

a recording region of the optical disk is divided into a plurality of zones in a radial direction,

said rotation control circuit controls rotation of the optical disk so that a linear velocity is substantially constant between respective zones by changing the rotation frequency for each zone, and

said focus control circuit adjusts the servo-loop gain in accordance with a steady state rotation frequency for each zone.

15. An apparatus according to Claim 12, wherein said focus control circuit adjusts the servo-loop gain by setting a gain proportional to an eccentric acceleration corresponding to the radial-direction position of the optical spot.

16. An apparatus according to Claim 12, wherein said focusing servo control circuit is controlled by a sampling frequency that changes in accordance with the radial-direction position of the optical spot, and wherein said focus control circuit performs gain adjustment in accordance with the radial-direction position of the optical spot in a state in which a coefficient of a phase compensation filter included in said focusing servo control circuit is fixed.

17. An apparatus according to Claim 12, wherein said focus servo control circuit is controlled with a constant sampling period in the entire region of the optical disk, and wherein said focus control circuit adjusts the servo-loop gain by adjusting a coefficient of a phase compensation filter included in said focus servo control circuit and a gain in accordance with the radial-direction position of the optical spot.

18. An apparatus according to Claim 12, wherein

a recording region of the optical disk is divided into a plurality of zones,

said rotation control circuit controls rotation of the optical disk so that a linear velocity is substantially constant between respective zones by changing the rotation frequency for each zone, and makes blocks among the plurality of zones, each having a rotation frequency within a predetermined rotation-frequency range, and

said focus control circuit adjusts the servo-loop gain for each block.

19. An apparatus according to Claim 12, wherein said focus control circuit adjusts the servo-loop gain so that when a servo gain at a highest rotation frequency Wmax is represented by Gmax, and a rotation frequency is represented by Wcurr, a servo gain Gcurr satisfies the following relationship:

$$Gcurr \fallingdotseq Gmax \times \sqrt{Wcurr/Wmax}$$

20. An apparatus according to Claim 12, wherein said tracking servo control circuit comprises a circuit that adjusts the servo-loop gain for tracking servo control, and wherein when said focus control circuit changes the servo-loop gain for focus servo control with a predetermined ratio, said tracking control circuit changes the servo-loop gain for tracking servo control with a ratio proportional to the square of the predetermined ratio.

21. An apparatus according to Claim 12, wherein said focus control circuit adjusts the servo-loop gain in accordance with a transient change of the rotation frequency caused by movement of the optical spot in a radial direction.